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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/661,633	DALY ET AL.	
	Examiner	Art Unit	
	Brian P. Werner	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 July 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37,39-51 and 53-61* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *all pending* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is responsive to the amendment and remarks received on July 19, 2004, the Information Disclosure Statement received on February 14, 2005, and to the corrected claim set received on Mat 26, 2006. Claims 1-37, 39-51 and 53-61 remain pending.

Specification

2. The disclosure is objected to because of the following informalities: The first paragraph of the specification claims priority to provisional application "60/302,911", which is incorrect. The proper serial number is 60/071,099. Appropriate correction is required.

Claim Objections

3. The following quotations of 37 CFR § 1.75(a) is the basis of objection:

> (a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

4. Claim 58 depends from cancelled claim 52. Claim 58 will be assumed to depend from claim 37 for examination purposes.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 10

Rejection:

6. Claim 10 is rejected under 35 U.S.C. 102(e) as being anticipated by Jacquin et al. (US 5,764,803 A).

Regarding claim 10, Jacquin discloses detecting a facial region ("face" at column 2, line 15) within a video ("video" at column 1, line 8) comprising (Note: preamble given weight because it is referred to in the body, and breaths life into the claim):

calculating a difference between a first and subsequent frame (figure 1, numeral 20);

determining plural candidate facial regions within the difference image ("candidate ellipses" at figure 2); and

fitting the candidate facial regions to the difference image to select one of the candidate facial regions ("chosen ellipse" at figure 2; "fitness metric" at column 7, line 15), based on a combination of three factors, including a fit factor representing a fit of the candidate ellipse to the difference image ("d_{border}" at column 7, line 19, equation 12), a location factor representative of the location of the candidate facial regions within the video (this limitation is equally anticipated by at least three elements in Jacquin: first, by "d_{motion}" at column 7, line 19, equation 12; second, by "separation measure D" at column 9, line 10; and third, by "location" at column 8, line 17), and a size factor representative of the size of the candidate facial regions (this limitation is equally anticipated by at least two elements in Jacquin: first, "P_{motion}" at column 7, line 19, equation 12, and second, "size and shape" at column 8, line 18).

Applicant's July 19, 2004 Remarks:

Summary of Applicant's Remarks: "Claim 10 requires that the fitting of the candidate facial regions be done within the difference image", while Jacquin's "fitting steps" are performed on a search region within "a subsequent frame of video", at page 20 of 23, bottom paragraph.

Examiner's Response: Claim 10 does require "fitting said candidate facial regions to said difference image" at step (e). Jacquin discloses an "ellipse identifier" at figure 1, numeral 30, which is depicted in detail at figure 2. As depicted both in figure 1 and in figure 2, candidate ellipses are fitted to the "foreground motion and edge image" produced by the "background remover" 28 in figure 1. The "foreground motion and edge image" is constructed from the

"motion and edge image" produced by the "image combiner" 24, which in turn is produced from the "globally MC diff image" produced by the subtractor 20 in figure 1. Given that the claim is open ended, and therefore does not precluded intermediate processing such as figure 1, numerals 22, 24 and 28, the ellipse identifier 30 operates on the difference image produced by numeral 20 of figure 1. Therefore, Jacquin indirectly fits candidate ellipses to the difference image 20, via numerals 22, 24 and 28. However, this indirect relationship is not precluded by the open ended claim structure, given that the difference image 20 is utilized to form the "foreground motion and edge image" ultimately used by the "ellipse finder" 30.

The examiner does not know where Jacquin teaches applicant's allegation of a "subsequent frame of video", given that no figures or specification citations were provided in support thereof.

Claims 21-23, 26-29, 31 and 33

Rejection:

7. Claims 21-23, 26-29, 31 and 33 are rejected under 35 U.S.C. 102(e) as being anticipated by Ryoo (US 5,990,957 A).

Regarding claim 28, Ryoo discloses a method for encoding video ("video coding" at column 1, line 7; preamble given weight because it is referred to in the claim body) comprising:

detection a location of a facial regions of a fame of video (a frame is segmented into "video object planes", or "VOPs" at column 2, line 16, as depicted in figure 5B; once such VOP is a facial region; i.e., "a face portion" at column 12, line 23);

calculating a sensitivity value for each of a plurality of locations within the frame (for each VOP, a sensitivity value is added or subtracted to the target bit allocation for a specific VOPs as described at column 11, lines 5-35; that is, bit are "incremented for important VOPs" at column 11, line 10; see "no_of_add_bits" at column 11, line 23; this number is then subtracted from unimportant VOPs; once such important VOP is that of the facial region as described at column 12, line 23); and

encoding the frame in a manner that provides substantially uniform apparent quality to perceiving detail at eccentric visual angles of the plurality of locations to the viewer when the viewer is observing the facial region (FIRST: "picture quality is enhanced ... since a uniform picture quality is generally maintained even when the compression rate is different between each portions of a picture in view of video characteristics" at column 12, lines 28-32; this is because the coding of all image areas in done in accordance with a "visual sensitivity classifier" at figure 2, numeral 23, which takes into account "human visual sensitivity" at column 2, line 21; SECOND: facial region is the subject of the video and what the viewer will focus on; so by encoding that region with finer quantization [i.e., less compression], the inherent property of the human visual system to perceive finer detail at the center of the field, and less detail in the periphery of vision is taken advantage of; therefore, even with coarser compression in the periphery [i.e., outside of the facial region], the apparent quality will be uniform).

Regarding claim 27, the total number of bits per frame is kept constant ("target bit rate of the entire frame is kept constant" at column 10, line 46; "entire bit amount can be kept constant" at column 12, line 18).

Regarding claims 22, 23 and 29, the encoding of the locations is based on a quantization value representative of a base quantization factor divided by sensitivity information (the target bit rate is divided by frame texture target bits, which is sensitivity information, at column 11, line 33).

Regarding claims 21, 22 and 31, the limitations recited therein are anticipated by Ryoo as described above. Further, and commensurate with the claim requirements, Ryoo adaptively quantizes and encodes "blocks" (i.e., "each macroblock" at column 5, line 27; "each block" at column 11, line 44).

Regarding claims 26 and 33, quantization values are adjusted according to the number of blocks remaining to be encoded ("target bits" at column 11, line 42), number of bits still available ("buffer occupancy" at column 11, line 44), and sensitivity and texture of the remaining blocks ("visual sensitivity ... variance for each block" at column 11, line 43).

Applicant's July 19, 2004 Remarks:

Summary of Applicant's Arguments: Claim 21 calls for "calculating sensitivity information ... based upon the sensitivity of a human visual system of a viewer perceiving image data at eccentric visual angles ..." and "no such element is present in Ryoo" at page 21 of 23.

Examiner's Response: Ryoo calculates a sensitivity value for each of a plurality of locations within the frame. That is, for each VOP, a sensitivity value is added or subtracted to the target bit allocation for a specific VOPs as described at column 11, lines 5-35. Bits are "incremented

for important VOPs" at column 11, line 10 (see "no_of_add_bits" at column 11, line 23; this number is then subtracted from unimportant VOPs). Once such important VOP is that of the facial region as described at column 12, line 23.

Ryoo then encodes the frame in a manner that provides substantially uniform apparent quality to perceiving detail at eccentric visual angles of the plurality of locations to the viewer when the viewer is observing the facial region. "Picture quality is enhanced ... since a uniform picture quality is generally maintained even when the compression rate is different between each portions of a picture in view of video characteristics" at column 12, lines 28-32. This is because the coding of all image areas in done in accordance with a "visual sensitivity classifier" at figure 2, numeral 23, which takes into account "human visual sensitivity" at column 2, line 21. The facial region is the subject of the video and what the viewer will focus on; so by encoding that region with finer quantization [i.e., less compression], the inherent property of the human visual system to perceive finer detail at the center of the field, and less detail in the periphery of vision is taken advantage of. Therefore, even with coarser compression in the periphery [i.e., outside of the facial region], the apparent quality will be uniform.

Summary of Applicant's Arguments: "Ryoo identifies a complexity classifier 21 which classifies each macro block by complexity" and "Ryoo does not suggest that complexity information be based upon a human sensivity model perceiving image detail at eccentric angles to a particular region of the frame of video" at page 21 of 23.

Examiner's Response: In Ryoo, "specific parts of a picture" are processed to a "desired quality" at column 12, line 18, whereby "it is possible that excellent picture quality is maintained in a face portion and lowered picture quality is maintained in other portions" at column 12, line 22. This is because the viewer will typically focus on the face in a scene, whereby the viewer's peripheral vision perceives the background. It is an inherent characteristic of the human eye that the fovea is the area of sharpest vision (center of the visual field), with decreasing sensitivity to detail and even color in the periphery of the field of vision. This is well known in the art as indicated by applicant's own figure 9. Therefore, Ryoo encodes a video image such that more bits are allocated to facial regions and fewer bits to peripheral regions, all based on a sensitivity calculation that takes into account the human visual system.

It is noted that applicant has not advanced any arguments regarding independent claim 31, which is rejected on the same grounds.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 13

Rejection:

9. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Jacquin et al. (US 5,764,803 A) and Sexton (US 5,086,480 A).

Regarding claim 13, Jacquin does not threshold the difference image by setting values of the difference image that are less than a threshold to a selected value.

Sexton discloses a system that detects faces in an image sequence (e.g., figures 2), comprising subtracting adjacent frames (figure 1, numeral 2), where Sexton teaches the further step of thresholding the difference image (figure 1, numeral 3) by setting values of the difference image that are less than a threshold to a selected value ("each pel below the threshold is set to minimum intensity (0)" at column 3, line 1).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to incorporate into the algorithm of Jacquin, following the image subtraction step at figure

1, numeral 20, the additional step of thresholding the difference image as taught by Sexton, in order to remove "a large quantity of the random noise" (Sexton, column 3, line 3) and thus improve the accuracy of facial detection and reduce processing time by removing noisy regions that are irrelevant to the extraction of a facial region.

Applicant's July 19, 2004 Remarks:

Applicant did not specifically traverse the rejection.

Claim 14

Rejection:

10. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Jacquin et al. (US 5,764,803 A) and Eleftheriadis et al. (US 5,852,669 A).

Regarding claim 14, Jacquin does not reduce the number of pixels (i.e., scale) in the frames prior to calculating the difference frame.

Eleftheriadis discloses a system that detects faces in an image sequence (e.g., figures 3 and 5), comprising pre-processing the image frames by reducing the number of pixels in the frames (figure 5, numeral 94 includes decimator 122 at figure 6, which reduces the image sizes; e.g., "decimation factor c" at column 6, line 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to reduce the image sizes of the current and previous frames of Jacquin (i.e., as depicted in figure 1) as a pre-processing step as taught by Eleftheriadis, to "provide for a low

computational complexity" and thus avoid "exhaustive searches" (Eleftheriadis, column 6, lines 49-52) by virtue of having to process fewer pixels, and thus less data which still retaining the important face like regions in the image.

Applicant's July 19, 2004 Remarks:

Summary of Applicant's Remarks: Regarding the examiner's combination of Jacquin and Eleftheriadis, whereby Jacquin's "current" and "previous" frames are size reduced prior to forming the difference image at block 20 of Jacquin, applicant alleges "the motion compensator data would be wasted on reduced pixel images because their resolution would be much lower and the compensator would not function properly to achieve the output of a globally motion-compensated difference image" at page 22 of 23.

Examiner's Response: Any of the image processing disclosed by Jacquin, or by the applicant for that matter can be performed on size reduced images with success. The decision to reduce images size is a classic tradeoff between processing speed and accuracy. For example, the applicant has chosen to reduce the image sizes immediately, at figure 1, numerals 16 and 18 without an apparent impact on the overall system accuracy. The applicant states that "the pixel reduction reduces the computational requirements of the system" at specification page 10, first paragraph. This is an almost axiomatic statement, that any person of ordinary skill in the art would recognize to be fact. However, one skilled in the art through computation and some experimentation would quickly find the critical mass between size reduction and system

performance. Eleftheriadis also recognizes the benefits of size reduction at figure 6, where he teaches size reduction as a pre-processing step at numeral 122. Eleftheriadis states, "the small input image size, provide for a low computational complexity of the disclosed facial detection system 14, and exhaustive searches of the large pools of candidates may thus be avoided" at column 6, line 50. In Jacquin, size reduction as a pre-processing step would have the exact same effect as recognized by the applicant, as well as Eleftheriadis. One of ordinary skill in the art would have recognized what sizes would be too small to achieve the required system accuracy, or too large to achieve the desired system speed. Eleftheriadis is utilized by the examiner as a "teaching" of the well known concept of size reduction as a pre-processing step, and one skilled in the art would know through computation and reasonable experimentation what sizes to choose.

Summary of Applicant's Remarks: "Jacquin shows decimation of the images subsequent to the differencing step" and had the reduction of the images prior to differencing been obvious, "Jacquin would have incorporated decimation at block 22 prior to differencing" at page 22 of 23.

Examiner's Response: If decimation of the "current" and "previous" images were performed in Jacquin as a pre-processing step as taught by Eleftheriadis, the decimation at Jacquin numerals 22 and 14 may not be necessary or may need to be adjusted accordingly. This is a modification that is well within the skill set of one of ordinary skill in the art. The modification of Jacquin according to the teaching of Eleftheriadis is not a bodily incorporation, but rather based upon a "teaching" that a reduction of image sizes as a pre-processing step reduces computational

complexity. One of ordinary skill in the art could readily make this combination work, with very little experimentation, and with reasonable success. The fact that other aspects of the Jacquin, such as the decimation steps of 14 and 22, may need to be adjusted or eliminated has not impact on the how the combination meets the claimed requirements, or on the success of the combination.

Claims 1, 4, 6 and 11[1]

Rejection:

11. Claims 1, 4, 6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Jacquin et al. (US 5,764,803 A) and McLaughlin (Randomized Hough Transform: Better Ellipse Detection).

The Jacquin Reference

Regarding claims 1 and 10 (from which claim 11 depends, which was addressed in the 102 rejection above), Jacquin discloses detecting a facial region ("face" at column 2, line 15) within a video ("video" at column 1, line 8) comprising (Note: preamble given weight because it is referred to in the body, and breaths life into the claim):

calculating a difference between a first and subsequent frame (figure 1, numeral 20);

[1] Claim 11 is inadvertently identified as claim "10" in the heading of the rejection in the previous Office Action. However, the subject matter of claim 11 was covered by the rejection (i.e., a "Hough" transform), and claim 11 was indicated as rejected in the office action summary. This omission of form rather than substance does not preclude finality.

determining plural candidate facial regions within the difference image ("candidate ellipses" at figure 2); and

fitting the candidate facial regions to the difference image to select one of the candidate facial regions ("chosen ellipse" at figure 2; "fitness metric" at column 7, line 15), where the difference image used for the fitting is free from being transformed as a result of the determining step (once the candidate ellipses are determined, then Jacquin uses a "fitness metric" at column 7, line 15 and equation 12 to compute the fitness of each of the candidate ellipses with the difference image directly; for example, Jacquin states, "measure of the density of edge data on a candidate ellipse border (i.e., the percentage of the pixels on the border which have classified as edge pixels be being assigned the value b2)" at column 7, line 20; that is, the density of the "pixel" data of the original difference image that are on the border of the candidate ellipse is measured; thus, in the "fitting" step, Jacquin uses the original, untransformed difference image).

Regarding claim 6, the fitting is based on a combination of three factors, including a fit factor representing a fit of the candidate ellipse to the difference image ("d_{border}" at column 7, line 19, equation 12), a location factor representative of the location of the candidate facial regions within the video (this limitation is equally anticipated by at least three elements in Jacquin: first, by "d_{motion}" at column 7, line 19, equation 12; second, by "separation measure D" at column 9, line 10; and third, by "location" at column 8, line 17), and a size factor representative of the size of the candidate facial regions (this limitation is equally anticipated by at least two elements in Jacquin: first, "P_{motion}" at column 7, line 19, equation 12, and second, "size and shape" at column 8, line 18).

Differences

Regarding claim 1, Jacquin's does not teach determining the plural candidate facial regions within the difference image **based on a transform of the difference image in a spatial domain to a parameter space**. Note: Jacquin does not specifically disclose how the initial candidate ellipses are formed. All Jacquin states is that "ellipse finder 44 generates candidate ellipses based on the foreground motion-and-edge image data" at column 6, line 61.

Regarding claims 4 and 11, Jacquin does not teach a Hough transform.

The McLaughlin Reference

Regarding claim 1, McLaughlin discloses a system in the field of image processing, and in the same problem solving area of finding ellipses in an image ("then the ellipse is judged to exist" at page 411, right column), comprising determining ellipses within an image based on a transform of the image in a spatial domain to a parameter space ("p, q, r1, r2, ✓" and "5D parameter space" at page 411, right column).

Regarding claims 4 and 10, McLaughlin's parameter space is Hough space ("Hough Transform for ellipse detection" at page 412, left column, bottom paragraph).

The Combination

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the Hough parameter space ellipse finding method taught by McLaughlin, as the method of generating the candidate ellipses required but unspecified by Jacquin (i.e., as

described by Jacquin at column 6, line 61), because the McLaughlin has "demonstrated high accuracy" and it has "shown tolerance to certain types of noise and partial occlusion" (McLaughlin page 414, left column), thus ensuring that the potential face regions of Jacquin are not missed even when in noisy image or when partially occluded by other objects in the image (as faces sometimes are).

Applicant's July 19, 2004 Remarks:

Summary of Applicant's Remarks: "As pointed out in connection with the §102 rejection based upon Jacquin, there is no teaching in Jacquin that candidate facial regions are determined within a difference image" at page 21 of 23.

Examiner's Response: The examiner in the response to the claim 10 arguments above has already addressed this.

Summary of Applicant's Remarks: "Claims 1 and 10 require a transform of the difference image in a spatial domain to a parameter space" at page 21 of 23.

Examiner's Response: While claim 1 requires this transform, but claim 10 does NOT. Claim 11, which depends from claim 10, does however does require the transform. The McLaughlin reference teaches, in the field of image processing and in the same problem solving area of finding ellipses in an image ("then the ellipse is judged to exist" at page 411, right column),

determining ellipses within an image based on a transform of the image in a spatial domain to a parameter space ("p, q, r1, r2, ✓" and "5D parameter space" at page 411, right column). Specifically, McLaughlin's parameter space is Hough space ("Hough Transform for ellipse detection" at page 412, left column, bottom paragraph) as required by claims 4 and 11.

Summary of Applicant's Arguments: "There is no suggestion in Jacquin of the desirability of using a Hough transform operating on the difference image" at page 21 of 23.

Examiner's Response: If there was such a suggestion, then Jacquin would have anticipated the claims and the McLaughlin references wouldn't have been necessary. Jacquin expresses the need to find ellipses in an image (figure 2, numeral 44), and McLaughlin teaches one such method for doing so. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Summary of Applicant's Arguments: "Jacquin combines a decimated motion image with a decimated edge image and then removes background. These steps obviate the need for a transformation to a parameter space" at page 21 of 23.

Examiner's Response: Disagreed. Jacquin's background removal actually benefits the ellipse finding routine of McLaughlin be removing background information that would not contain

important information (i.e., noise), thus reducing the amount of data for the ellipse finding. However, the fact of the matter is that Jacquin operates on an "image" to find an "ellipse", and McLaughlin teaches a beneficial way of doing so using Hough parameter space. There is nothing in the pre-processing of Jacquin that would obviate use of McLaughlin's ellipse finding routine.

Summary of Applicant's Arguments: "The "ellipse finder" 44 of Fig. 2 operates on video that has been transformed so that ellipses are easily identifiable" at page 22 of 23.

Examiner's Response: Again, the fact that ellipses are "easily identifiable" is a benefit, not a detriment to McLaughlin. Furthermore, the ellipses of Jacquin are not that easily identifiable, given that Jacquin finds "candidate ellipses" and utilizes a scoring routine to fined a "chosen ellipse" at figure 2.

In summary, Jacquin seeks to find candidate ellipses in a "foreground motion and edge image" at figure 2. McLaughlin's ellipse finding routine does not care about the type or content of an image to find an ellipse therein. McLaughlin finds ellipses in an efficient manner in any type of image. If anything, Jacquin's removal of unimportant information would serve to expedite McLaughlin's routine.

Claims 2 and 3

Rejection:

12. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Jacquin et al. (US 5,764,803 A) and McLaughlin (Randomized Hough Transform: Better Ellipse Detection) as applied to claim 1, and further in combination with Sexton (US 5,086,480 A).

Regarding claims 2 and 3, Jacquin does not threshold the difference image by setting values of the difference image that are less than a threshold to a selected value.

Sexton discloses a system that detects faces in an image sequence (e.g., figures 2), comprising subtracting adjacent frames (figure 1, numeral 2), where Sexton teaches the further step of thresholding the difference image (figure 1, numeral 3) by setting values of the difference image that are less than a threshold to a selected value ("each pel below the threshold is set to minimum intensity (0)" at column 3, line 1).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to incorporate into the algorithm of Jacquin, following the image subtraction step at figure 1, numeral 20, the additional step of thresholding the difference image as taught by Sexton, in order to remove "a large quantity of the random noise" (Sexton, column 3, line 3) and thus improve the accuracy of facial detection and reduce processing time by removing noisy regions that are irrelevant to the extraction of a facial region.

Applicant's July 19, 2004 Remarks:

Summary of Applicant's Remarks: "In Sexton, the thresholds are set to remove noise" and "a completely different method is employed in Jacquin", and "nothing in Sexton or Jacquin suggest that Sexton's thresholding step would be of any value in Jacquin's process" at page 22 of 23.

Examiner's Response:

The examiner agrees that Sexton's thresholds are set to "remove noise". In fact, Sexton states that the thresholds serve to remove "a large quantity of the random noise" at Sexton column 3, line 3.

Regarding applicant's statement that "a completely different method is employed in Jacquin", the examiner uncertain as to what "method" applicant is referring to. The fact that Jacquin's overall face finding method takes a different approach that that of Sexton has no bearing on the "teaching" of Sexton relied upon in the rejection. Furthermore, Sexton calculates a difference image (Sexton figure 1, numeral 2) just like Jacquin (Jacquin figure 1, numeral 20), whereby Sexton immediately processes the difference images to remove noise prior to performing any additional processing (Sexton figure 1, numeral 3). This processing serves to reduce or eliminate extraneous noise that would otherwise complicate the subsequent processing. It is this "teaching" (i.e., noise removal through thresholding) that is relied upon by the examiner in the rejection.

Regarding a suggestion to combine, thresholding Jacquin's difference image would remove "a large quantity of the random noise" as stated by Sexton at column 3, line 3, and thus

improve the accuracy of facial detection and reduce processing time by removing noisy regions that are irrelevant to the extraction of a facial region. One skilled in the art would have understood this, and could have implemented the threshold in Jacquin with a reasonable degree of success and without unreasonable experimentation.

Claim 7

Rejection:

13. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Jacquin et al. (US 5,764,803 A) and McLaughlin (Randomized Hough Transform: Better Ellipse Detection) as applied to claim 1, and further in combination with Eleftheriadis et al. (US 5,852,669 A).

Regarding claim 7, Jacquin does not reduce the number of pixels in the frames prior to calculating the difference frame.

Eleftheriadis discloses a system that detects faces in an image sequence (e.g., figures 3 and 5), comprising pre-processing the image frames by reducing the number of pixels in the frames (figure 5, numeral 94 includes decimator 122 at figure 6, which reduces the image sizes; e.g., "decimation factor c" at column 6, line 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to reduce the image sizes of the current and previous frames of Jacquin (i.e., as depicted in figure 1) as a pre-processing step as taught by Eleftheriadis, to "provide for a low computational complexity" and thus avoid "exhaustive searches" (Eleftheriadis, column 6, lines

49-52) by virtue of having to process fewer pixels, and thus less data which still retaining the important face like regions in the image.

Applicant's July 19, 2004 Remarks:

Applicant's remarks have already been addressed in response to the claim 14 arguments above.

Double Patenting

14. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

15. All of the pending claims are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over the patented claims U.S. Patent No. 6,173,069 B1. Because of the number and variation between of claims, one claim will be exemplified. For example, claim 37 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 18 of U.S. Patent No. 6,173,069 B1. Although the conflicting claims are not identical, they are not patentably distinct

from each other because claim 18 teaches all of the elements of claim 37. The filing of a proper and timely terminal disclaimer will serve to overcome this rejection immediately.

Allowable Subject Matter

16. Claims 5, 8, 9, 12, 15-20, 24, 25, 37, 39-51, 53-61[2] are allowable over the prior art, but remain rejected under obviousness type double patenting.

17. Claim 32 and 34-36 are objected to as being dependent upon a rejected base claim, but would be allowable over the prior art if rewritten in independent form including all of the limitations of the base claim and any intervening claims; and upon the filing of a terminal disclaimer to overcome the double patenting rejection.

18. At page 20 of 23 of applicants July 19, 2004 remarks, applicant states that claims "30, 32 through 36" have either been "rewritten as independent claims ... or have been amended so as to depend from a rewritten independent claim". Claim 30, while being objected to, has NOT be rewritten in independent form and does NOT depend from a rewritten claim. Likewise for claims 32-36. These claims remain rejected over the prior art.

Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian P. Werner whose telephone number is 571-272-7401. The examiner can normally be reached on M-F, 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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[2] Dependent claim 58 currently depends from cancelled dependent claim 52. Dependency needs to be changed to claim 37 before allowance of the application as a whole.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Brian Werner
Primary Examiner
Art Unit 2624
August 10, 2006

BRIAN WERNER
PRIMARY EXAMINER